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ABSTRACT

A theoretical model of turnover in work organizations was applied to the college student dropout process at a major midwestern land grant university. The 854 freshmen women subjects completed a questionnaire that included measures for 14 independent variables: grades, practical value, development, routinization, instrumental communication, participation, integration, courses, distributive justice, campus organizations, opportunity, marriage, satisfaction, intent to leave. It was projected that 12 determinants would influence satisfaction, intent to leave and dropping out in a causal sequence. The model was estimated using path analysis and multiple regression. Nine variables were ranked by total causal effects. From high to low, these were: intent to leave, grades, practical value, opportunity, marriage, satisfaction, campus organizations, courses, and participation. The dropout data were obtained for spring and fall semesters 1979 and spring 1980. It is suggested that the attrition model, based on the Price/Mueller model of turnover in work organizations, was supported by estimation procedures, and that much can be learned about student behavior from the study of employee behavior. The chief difference between the findings for Price and Mueller and the present study was in the effectiveness of intention as an intervening variable to influence dropout or turnover decisions. One reason for this difference is probably due to the shorter time interval for students than for employees between gathering the data on the determinants and the data on dropouts. (SW)

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THE APPLICATION OF A MODEL OF TURNOVER IN WORK ORGANIZATIONS TO THE STUDENT ATTRITION PROCESS

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ABSTRACT

A theoretical model of turnover in work organizations was applied to the dropout process. Data were obtained by questionnaire from 854 freshmen women at a major midwestern land-grant university. The questionnaire included measures for the fourteen independent variables in the model. Twelve determinants were expected to influence satisfaction, intent to leave, and dropout in a causal sequence. The model was estimated using path analysis and multiple regression. Nine variables were ranked by total causal effects. From high to low, these were: intent to leave, grades, practical value, opportunity, marriage, satisfaction, campus organizations, courses, and participation (R^2 = .48).

THE APPLICATION OF A MODEL OF TURNOVER IN WORK ORGANIZATIONS TO THE STUDENT ATTRITION PROCESS

Introduction

A case hardly need be developed for the importance of studying student attrition in this period of a shrinking pool of high school students and high levels of paranoia about the impacts decreased enrollments may have on the existence of institutions. Understanding the attrition process may alleviate some of the anxiety present among faculty and administrators, but more importantly, this understanding will allow institutional personnel to intervene in a coherent fashion to reduce dropout.

Discovering the reasons why students leave an institution has long been of interest to scholars in the field (Astin, 1975; Cope and Hanna, 1975; Heywood, 1971; Knoell, 1960; Pantages and Creedon, 1978; Pascarella, 1980; Sexton, 1965; Spady, 1970; Summerskill, 1962; Tinto, 1975). The lack of theoretical models to describe the attrition process, loudly decried in the 1960's and 70's (Knoell, 1960; Spady, 1970; Pantages and Creedon, 1978) has been partially alleviated by the work of Spady (1970), Tinto (1975), Pascarella (1980), and Bean (1981a). The use of theoretical models is greatly desired, since theory guides research and brings some degree of cosmos to the chaotic array of variables available to the researcher of dropout.

One obvious place to look for models which may generalize to the attrition process is at the literature on turnover in work organizations. The assumption is made that members leaving an organization may do so for similar reasons, regardless of whether it is an employee leaving a work organization or a student

leaving a college or university. Price (1977) provided a major review of the literature related to turnover in work organizations, and Price and Mueller (in press) have revised and expanded Price's original model based on an extensive empirical investigation. It is this model of turnover that forms the basis for the industrial model of student attrition to be estimated in this paper.

There are two major purposes to this paper. The first is to describe the industrial model of student attrition, how it was derived from the Price/Mueller model, and review some relevant literature. The second is to estimate the model, and to identify the relative importance of the different variables in the model in explaining the criterion, dropout. Some implications for future research and practical considerations will be discussed.

The Industrial Model of Student Attrition

The causal model of turnover developed by Price and Mueller (in press) contains eleven determinants[1] and two intervening variables. Job satisfaction and intent to stay (identical but opposite to "intent to leave") are expected to intervene between several of the determinants and turnover, with satisfaction casually prior to intent. According to Price and Mueller:

> Alternative jobs outside the hospital (opportunity) serve to increase directly the amount of turnover. Seven determinants have an indirect impact on turnover through job satisfaction. Repetitive work (routinization) decreases job satisfaction, whereas participating in job-related decisions (participation), being informed about job-related issues (instrumental communication), having close friends employed by the same organization (integration), receiving good pay, being fairly compensated (distributive justice), having an opportunity to obtain a better job in the organization--all operate to increase job satisfaction. And as job satisfaction increases, individuals evidence greater intent to stay with the organization. Three determinants have an indirect impact on turnover through intent to stay. Increased dedication to occupational standards of performance and general occupational socialization serve to decrease intent to stay, whereas obligations to local kin serve to increase intent to stay. Finally, the model indicates that intent to stay has a direct negative impact on turnover (in press:3)(parenthetical notes added)

The model consists of seven variables related to the interaction of the

individual with the organization (the seven variables influencing satisfaction); three variables related to the organizational environment (opportunity, memberships in professional organizations, and kinship responsibility); one "background" variable, generalized training, which indicates the educational level attained before the time the respondent completes the questionnaire, and the two intervening variables, satisfaction and intent to stay. These thirteen variables and their linkages constitute the causal model of turnover. A substantial amount of supporting evidence, in the form of major and minor reviews of the literature and empirical studies were cited in creating the model (Price, 1977:66-91; Price and Mueller, in press). It is this model, then, that forms the point of departure for the development of the industrial model of student attrition.

The industrial model of student attrition (a term used interchangeably with "dropout") closely parallels the Price/Mueller model of turnover. The criterion variable, dropout, is defined as the cessation of individual student enrollment in a particular institution. The unit of analysis is that of a single institution. The study focuses on the individual student's interaction with a particular institution, and thus is consistent with the empirical studies of Rootman (1972) who used the "person-role fit" theory, and Bean who used a synthetic model of student attrition (Bean, 1981). The model developed here also has much in common with that of Bean (1980). The structure of the model is similar, except for the elimination of the background variables, and the variables included here were indicated by Price and Mueller's (in press) newer work.

The industrial model of student attrition is presented in Figure 1. Definitions for the variables are presented in Table 1. The structure of the model

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FIGURE 1 and TABLE 1 INSERT ABOUT HERE.

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is taken directly from the Price/Mueller model, however, several important substitutions of variables are made in order to make the model more appropriate for the study of students rather than employees. Satisfaction with being a student is substituted for job satisfaction, and intent to leave is used in place of intent to stay, which results in the relationship between intent to leave and dropout being positive, and between satisfaction and intent to leave being negative. The ordering of the variables, with satisfaction preceeding intent to leave, which is the immediate precursor of the criterion, is identical to the model of turnover. In the model of turnover, seven exogenous variables are expected to have a direct impact on satisfaction. Five of these seven (routinization, participation, instrumental communication, integration and distributive justice) are identical for each model, although operationalized slightly differently. Pay, assumed to be one of the most important influences on job satisfaction, does not occur specifically for students who are not "paid" in the sense that an employee is paid for accomplishing certain tasks. Three surrogate measures for pay are included in this study (grades, practical value, development). The rationale and supporting evidence for these surrogate measures is presented elsewhere (Bean, 1978:24-32), and will only be briefly summarized here. Grades represent what Tinto (1975:104) called an "extrinsic reward" which, as tangible resources, could be utilized for future educational and career mobility. As such, they are perhaps the closest surrogate to pay in work organizations. Spady (1970) elaborates:

> . . . grades represent the most conspicuous form of reward. They are basically extrinsic and are used as tangible resources in the quasi-occupational role-playing of the career-oriented student in his negotiations for improved opportunity for success. (p. 77)

The practical value of one's education used as a surrogate measure for pay indicates the degree of belief that one's education will lead to future employment and thus future pay. As such it can be considered as access to future pay

based on current activities. Kamens (1968) isolated a variable strongly associated with college size and quality. It was the student's image of future careers in the economy, or the "pay-off" of college.

> The data supported our contention that higher quality and larger schools increase the clarity of the student's view of their occupational and economic structure and enhance their belief that the student role at their college is the most effect way to enter these careers, thereby lowering the rate of dropout at these schools. (p. 683)

The psychological assumption necessary for the proposition that higher levels of practical value will probably lead to lower levels of attrition is that it is desirable for one's education to lead to future employment. If a student enrolled at a college believes that the institution is providing such an education, this will result in an increase in the student's satisfaction with the institution.

The final pay-surrogate measure is self-development. Whereas an employee seeks some measure of immediate extrinsic reward for work, students seek personal development--the attainment of a set of skills (such as problem-solving, judgment, and interpersonal skills) useful to future employers. Although the development of these skills may appear to be motivated by intrinsic needs, one can assume that those who develop certain skills as a result of their formal education will have a better chance of getting and keeping higher paying jobs than those who lack these skills. Thus, the development of these skills, albeit indirectly, is related to future pay, and will be considered as a pay surrogate measure for the purpose of this study. Again, development is expected to act through satisfaction in influencing dropout.

In addition to these eight determinants, two others, courses and memberships in campus organizations, are expected to influence satisfaction and thus dropout. The first, courses, is taken to be a measure of job content. This variable is viewed as being analogous to the "work" facet of the Job Descriptive

Index developed by Smith, Kendall, and Hulin (1969). Having the courses one wants to take at an institution should be similar to having a job whose tasks one wants to perform. In either case, one's satisfaction should increase as the desirability of task or course content increases.

The second variable, memberships in campus organizations, is analogous to what Price and Miller (in press) called professionalism. Professionalism was operationalized by the number of memberships in professional associations, and how often one attends these meetings. Professionalism was expected to have a negative influence on intent to stay. Memberships in campus organizations was operationalized by the number of these memberships. Because campus organizations are internal to the institution, these memberships would be expected to have a negative influence on intent to leave, an effect opposite that of professionalism. Memberships in voluntary subunits within an organization would suggest that a person is satisfied with the organization, (that is, voluntarily increases individual-organizational exchanges) and would increase what Tinto (1975) called social integration.

The Price/Mueller model has one additional variable expected to influence satisfaction: promotional opportunity. This variable was not included in the model of student attrition. One analogy might be being "promoted" from the freshman class to the sophomore class. This variable does not seem to have the same content as promotional opportunity. Generalized training was another variable omitted from the attrition model. This variable was operationalized by the nurses level of training (e.g. high school diploma, A.A degree, etc.). Since nearly everyone in college has a high school diploma, the variable would for all practical purposes be a unity, and lend nothing to the understanding of the attrition process.

The remaining two variables, kinship responsibility and opportunity, were

included in the model in modified form. The opportunity variable was changed from opportunity to get another job to opportunity to transfer to another college. In the industrial model of student attrition, opportunity is assumed to influence both intent to leave and attrition directly. This assumption is made because people would probably not intend to leave unless they have explored alternative roles in the work environment, and thus opportunity would influence intent as well as influencing dropout directly. Kinship responsibility in the Price/Mueller model indicates the level of responsibility one has to a spouse and children, and the importance of being a good spouse and parent. Since married students were excluded from this study (due to their small numbers), this variable was operationalized by asking about the likelihood that a student would marry before graduating. It is assumed that the more likely one is to marry, the more likely one would be to intend to leave school or actually drop out either to move with the spouse to a new location, or to work full-time to support the spouse. Thus, likelihood of marrying is expected to have a positive impact on intent to leave and dropout.

Several characteristics of the Price/Mueller model deserve special attention. To begin with, Price and Mueller attempted to create an inclusive model--one containing a comprehensive set of variables, and not variables of just one type, like pay variables. Second, the linkages in their model are recursive, that is, there is a one-way directional causality. Third, the linkages are positive or negative, linear as opposed to non-linear, and additive as opposed to multiplicative. The causal ordering in their model is based primarily on Price's (1977) extensive review of the literature. The one major revision to the original Price model involved the addition of intent to stay as an intervening variable between job satisfaction and turnover. This addition was based on the recent work of Porter and his colleagues (Porter et al., 1974; Steers,

1977; Porter et al., 1976; and Koch and Steers, 1978) and Mobley (Mobley, 1977; Mobley et al., 1979). Finally, their model is deemed "tentative," and will undoubtedly be revised further as the results from empirical studies are evaluated.

As has been described, the model of attrition to be estimated in this paper shares the structural characteristics with the Price/Mueller model, and differs only in the inclusion of substitute variables (e.g., grades, practical value and development for pay), the exclusion of two variables which seem inappropriate (promotional opportunity and general training), and the addition of the variable courses as being analogous to job content in influencing satisfaction. The industrial model of attrition shares much in common with other models of student attrition (Spady, 1970; Tinto, 1975; Bean, 1980, 1981a). In each of these models, a group of variables based on the background of the student and the student's interaction with the institution, were expected to influence satisfaction (or other attitudes), which in turn increased institutional commitment (which was similar to the intent to leave variable), which immediately preceeded dropout. The main differences with the past models are: the exclusion of background variables (prematriculation characteristics); the specification of intention (as opposed to institutional commitment) as the immediate precursor of attrition (true also in Bean, 1981a); the identification of specific interactions with the organization as determinants of satisfaction (Spady and Tinto used a more "omnibus" variables, such as normative congruence); and a clearly specified one-way causal ordering, which was somewhat unclear in the Spady and Tinto models. Even with these differences, it is felt that the industrial model of student attrition is complementary to, and not contradictory to, these previous models. Further support for the inclusion of this set of variables as determinants of student attrition is presented elsewhere (Bean, 1978, 1979).

Methodology

Data for this study were collected using a two-step longitudinal process. In the first step, an instrument, developed and pilot tested on three other campuses, was mailed to all freshmen registered at a major midwestern land-grant university during the spring term of 1979 (N=4,045). The rate of return was 47 percent. From the 1,909 respondents, a homogeneous subsample of 876 women was selected for the analysis. Only women were used because the sample used to estimate the Price/Mueller model of turnover was taken from the nursing profession, and consisted entirely of women. Homogeneousness was desired to eliminate the possible influence of confounding variables (Kerlinger, 1973). Only women who met the following criteria were included in the analysis: unmarried, full-time freshmen who were 21 years old or younger, who had not transferred from another institution and were U.S. citizens. Listwise deletion was used to treat the missing data, and 820 cases were used in the estimation procedures.

The instrument contained 98 items from which measures for the 14 independent variables used in the analysis. The stems for the items are presented in Table 1. The majority of these items were Likert scales ranging from "a very small extent," scored 1, to "a very large extent," scored 5. Other questions asked for factual information, such as university grades and the number of memberships in campus organizations. Items assumed to measure the same construct were combined using the principles of factor-based composites (Kim and Mueller, 1978). Factor analysis, using the varimax criterion and orthogonal rotation, was also used to assess concurrent and convergent validity, which was found to be adequate (Campbell and Fiske, 1959). Eleven determinants were constructed from the use of more than one item (see Table 1), and three (grades, courses, campus organizations) were indicated by single items. The reliability of the

multi-item indicies was measured by Cronbach's coefficient alpha, and averages .79, which is near the level of .80 suggested by Nunnally for basic research (1967). Four measures had reliability coefficients below .80 (routinization (.75), marriage (.66), integration (.64), and distributive justice (.54). Seven measures had reliability coefficients at .80 or above (intent to leave (.96), practical value (.91), satisfaction (.87), development (.87), instrumental communication (.83), participation (.82), and opportunity (.80).

The second step in data collection was to discover who had dropped out of school between April, 1979 and March, 1980. Data regarding dropout was taken from registration tapes for spring semester, 1979, fall 1979, and spring 1980. Of the total list of 876 women selected for the analysis, 12 were deleted because the identification number on their questionnaire did not match ID numbers for registered students during spring semester, 1979. Another 10 were deleted because they were stopouts, not registered for fall of 1979, but registered for spring of 1980. Of the remaining 854 women, 687 (80.4%) were continuously registered for these three semesters, and considered "stayers." These students scored "0" on the dropout variable. There were 125 women who failed to register for either fall of 1979 or spring of 1980 who were scored 2, and 42 (4.9%) who were registered in the fall of 1979, but were not in March of 1980 (scored 1). Thus 20 percent of the subjects dropped out during the year when the data was gathered, but because of the scoring method, the mean for the dropout variable is .34 ((125 x 2) + (42 x 1))/854 = .34). A similar method of scoring the dependent variable was used by Spady (1971). The rationale for this scoring method is that attitudes and intentions change over time, and although one may be able to accurately predict behavior based on intentions for a short time, as time goes on intentions effect on behavior diminishes. Thus, behavior measured near when an attitudinal or intent measure is taken should be weighted more

heavily that later behavior.

The data were analyzed using multiple regression analysis and path analysis. Path analysis is a statistical procedure which can be used to estimate the parameters of the model, that is, the direct and indirect effects of the variables in a system whose causal sequence has already been established (Land, 1969; Kerlinger and Pedhazur, 1973; Asher, 1976). The paths indicated in Figure 1, as well as those implicit in the model but not connected by an arrow, will be estimated. Because the model is recursive, ordinary least squares reqression analysis can be used to estimate the path values. Path values are the standardized partial regression coefficients (beta weights). The effects coefficients (Lewis-Beck, 1977; Lewis-Beck and Mohr, 1976) represent the total effect of an independent variable and the dependent variable. These effects can be decomposed into the direct effect, and indirect effects through the intervening variables (satisfaction and intent to leave) which are placed between the exogenous variables and dropout. The indirect effect of satisfaction is calculated through intent to leave. Direct effects, indirect effects, and total causal effects (effects coefficients) will be presented in Table 4.

It should be recalled that an attempt was made to reach all the women in the freshman class. The total number of women respondents (1,028) was reduced to 820 due to selection criterion, missing data, and stopouts. The use of significance tests in the analysis was done in order to avoid making arbitrary assumptions about the importance of variables in the model.

Results

Table 2 contains the zero-order correlations for all the variables in the model. All but six of these correlations are below .3, and five of these six

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TABLE 2 ABOUT HERE

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correlations above .3 fall between .3 and .4. The highest correlation (.673) is between intent to leave and dropout. Thus, with a few exceptions, the determinants are largely independent of each other, and second, among the determinants and intervening variables, only intent to leave is highly correlated with dropout. Stated another way, no variable by itself, except intent to leave, accounts for more than 7 percent of the variance in dropout. The influence of each of the determinants in the set on dropout will be relatively independent of other influences, but none is very large. Table 2 also indicates the means and standard deviations for the variables.

The results for the multiple regressions indicated by the path model (Figure 1) are found in Table 3. The convention was followed that all one-way paths implicit in the model were estimated, not just those identified by arrows in

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Table 3 about here

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the path model. Table 3 contains the beta weights which represent the path coefficients for the determinants and intervening variables for six regressions. In the first regression, satisfaction is regressed on the determinants. In the second, intent to leave is regressed on the determinants, and in the third, intent is regressed on the determinants and satisfaction. In the fourth through sixth regressions, dropout is the criterion. The fourth regression contains only the determinants, the fifth contains the determinants and satisfaction, and the sixth contains the determinants, satisfaction and intent to leave. By the addition of the intervening variables, one can judge the importance of the added variable in increasing the amount of explained variance. Once can also assume that if a variable is significantly related to dropout with an intervening variable absent from the equation, but loses this significance when the intervening variable is added, that the variance originally accounted for when the intervening variable is absent is subsumed by the intervening variable when it is

present. Finally, the regressions which use dropout as the criterion can be used to estimate the relative importance of the independent variables in influencing dropout. Findings for the three dependent variables will be presented next.

Satisfaction. The twelve determinants accounted for 24.3 percent of the variance in satisfaction. The adjusted or "shrunken" R^2, written "$\bar{R}^2$" adjusted for the degrees of freedom, was .232. Nine of the twelve determinants were significantly related to satisfaction at the $p = .05$ level or higher. (In the discussion here, unless otherwise indicated, the number which follows the variable indicates the path coefficient (standardized partial regression coefficient) between the independent variable and the dependent variable.) For the 820 women selected for this analysis, in descending order of importance, the nine variables significantly related to satisfaction were: development (.227); courses (.133); grades (.129); integration (.093); campus organizations (.088); distributive justice (.086); practical value (.075); routinization (-.065); and participation (.064).

Intent to Leave. The twelve determinants account for 26.6 percent of the variance in intent to leave ($\bar{R}^2 = .255$). With the addition of satisfaction to the equation, the R^2 increased slightly to account for 27.1 percent of the variance ($\bar{R}^2 = .259$). With satisfaction in the equation, the seven variables significantly related to intent to leave were, in descending order of importance: practical value (-.306); opportunity (.173); marriage (.124); campus organizations (-.103); grades (-.094); satisfaction (-.081); and distributive justice (.066).

Dropout. The twelve determinants accounted for 17.6 percent of the variance in dropout ($\bar{R}^2 = .164$). With the addition of satisfaction to the equation, the R^2 rose to .183 ($\bar{R}^2 = .170$). With the addition of both satisfaction and intent to leave to the equation, the explained variance in dropout rose to 48.6 percent ($\bar{R}^2 = .477$). With both satisfaction and intent in the equation, in descending

order of importance, the four variables significantly related to dropout were: intent to leave (.644); grades (-.139); courses (.079) and marriage (.061). When only the determinants were included in the regression, campus organizations had a significant negative influence on dropout. When satisfaction was added, satisfaction had a significant negative influence on dropout, courses had a significant positive influence on dropout, but the statistical significance of campus organizations on dropout was lost. When both satisfaction and intent to leave are in the equation, practical value, opportunity, and satisfaction lose statistical significance. This loss of significance is due to the variance shared by the determinants and the intervening variables. Intent to leave is said to subsume the variance of those variables such as practical value which lose significance when intent is added to the equation. Intent to leave is shown to have more than four times the importance of grades, its nearest rival, in influencing dropout.

Total Causal Effects. Before proceeding with a discussion of the individual variables in this model, the total causal effects will be discussed. Total effects, sometimes called effects coefficients (Lewis-Beck and Mohr, 1976), represent the total influence of one variable on another, and can be broken down into direct effects and indirect effects. The direct effect between the two variables is the path coefficient. The indirect effects calculated through an intervening variable, is the product of the path coefficients between the determinant and the intervening variable and the intervening variable and the dependent variable. The total effects are the sum of the direct and indirect effects. Direct effects, indirect effects via intent to leave, indirect effects via intent to leave and satisfaction, total effects and a rank order of the importance of these effects is presented in Table 4. Indirect effects through

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TABLE 4 ABOUT HERE

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satisfaction were not calculated because satisfaction was not significantly related to dropout when controlling statistically for the effects of intent to leave. Computations of total effects lead to the following ranking of the variables: intent to leave (.644); grades (-.206); practical value (-.181); opportunity and marriage (both = .143); satisfaction (-.098); campus organizations (-.069); courses (.066); and participation (-.057). Development, routinization, instrumental communication, integration, and distributive justice had total effects below .05 which are generally considered as not meaningful (Land, 1969), and thus were not ranked in Table 4.

Discussion of the Industrial Model of Student Attrition

The findings for the regressions indicated by the path model and the total causal effects of the determinants and intervening variables have now been described. The discussion will be divided into two parts. First, the general findings for the industrial model of student attrition will be presented. This will be followed by a discussion of the findings for the individual variables.

In general, the model of attrition developed in this paper, based on the Price/Mueller model of turnover in work organizations, was supported by the estimation procedures. Eleven of the twelve determinants were related to satisfaction in the predicted fashion (i.e. nine were significantly related and two (opportunity and marriage) which were not expected to be significantly related in fact were not significantly related). The determinants accounted for 23 percent of the variance in student satisfaction. The twelve determinants in the Price/Mueller model accounted for 26 percent of the variance in job satisfaction, but behaved in a much different fashion. Only two of the determinants significantly related to student satisfaction or job satisfaction behaved in the same way--routinization was negatively related to satisfaction and participation

was positively related to attrition. Otherwise, the results differed. For students, the pay surrogate measures (development and grades) were the best predictors of satisfaction, while for nurses (the subjects in the Price/Mueller model) routinization and instrumental communication were the best predictors. Instrumental communication was not significantly related to satisfaction for students, while pay was not significantly related to satisfaction for nurses.

Satisfaction and the determinants accounted for 19 percent of the variance in intent to stay for nurses and 26 percent of the variance in intent to leave for students. For nurses, satisfaction, general training, kinship responsibility, opportunity and pay had a statistically significant influence on intent, while for students, practical value, opportunity for marriage, campus organizations, grades, satisfaction, and distributive justice had a statistically significant influence on intent. For both groups, pay (or pay surrogates), satisfaction, and the environmental variables related to opportunity and to family (or future family) had significant influences on intent. The relative contributions of the variables in the two regressions differed. Specifically, for nurses, satisfaction had the largest influence on intent, while for students, satisfaction was significantly related to attrition, but had only about one fourth as much influence on attrition as did practical value.

In the Price/Mueller model, three variables were significantly related to turnover (opportunity, general training, and intent) and accounted to 18 percent of the variance in turnover. In this study of attrition, four variables (intent, grades, courses, and marriage) were significantly related to and accounted for 48 percent of the variance in attrition. Intent was the best predictor in both cases. The explained variance was due largely to the intent variable, and the explained variance is higher in this study because the zero-order correlation between intent and dropout was higher here (.673) than for Price/Mueller (.404).

In both instances, the determinants did not explain the variance in intent very well (Price/Mueller = .19; this study = .26). Based on another study (Bean, 1981) the addition of more attitudinal variables besides satisfaction is probably indicated in order to increase the amount of explained variance in intert.

Comparison with one other study is also informative. Bean (1980) used a similar model to estimate attrition at another major midwestern university. In a regression using 26 variables, the findings were the same (in terms of direction of the effect and significance/nonsignificance of the relationship) for grades, practical value, development, routinization, instrumental communication, and opportunity. Zero-order correlations are presented in the Appendix for 13 variables which were the same for this study and Bean (1980), as well as for seven variables from Price and Mueller (in press). The consistency of the correlations between the data presented here and in Bean (1980) is remarkably high. Using the correlations between the determinants and satisfaction as data points, 93 percent of the variance in the correlations in one data set can be explained by the correlations in the other. With the correlations between the independent variables and intent to leave as data points, 94 percent of the variance in the correlations is explained. These data, taken from two different institutions two years apart, indicate a high degree of stability in the relationships between these determinants and the intervening variables, enhancing the validity of both studies. Greater differences exist among the correlations between the determinants and dropout because dropout was operationalized differently in the different studies. The chief difference between these two studies is the zero-order correlation between intent to leave and dropout. In the earlier study it was .456, and in this study it was .673. There are two possible reasons for this. In the first study, the data was gathered toward the end of the first semester of the freshman year. Intent was a dichotomous variable based on who

returned and was registered the next fall, some nine months later. In the current study, data on intent was gathered in April and registration data was gathered in August and the following March. Since the majority of students dropped out over the summer, intent was a prediction of behavior four months and not nine months later. For this reason, students in the current study fared better at predicting their dropout behavior because less time was involved between data collection on intent and registration or dropout.

Discussion of the Findings for the Individual Variables

Intent to Leave. Based on previous studies and on theory, intent to leave was expected to have the greatest influence on dropout. This was found to be the case in this study. The determinants and satisfaction were found to make an independent contribution to dropout of .033; the determinants and satisfaction and intent to leave made a joint contribution of .150; and intent made an independent contribution of .303 to the total explained variance of .486. By itself, intent could explain 45.3 percent of the variance in dropout. This finding makes the use of the intent variable in future studies of attrition based on survey research almost mandatory. The location of intent in the industrial model of student attrition is well justified.

Satisfaction. Based on the model of turnover, satisfaction was expected to have the greatest influence on intent to leave of any of the variables in the model. This was not found to be the case for students. Satisfaction had a significant negative influence on intent to leave, but five other variables had higher beta weights indicating a greater influence on intent than satisfaction had. On the other hand, eleven of the twelve determinants were related to satisfaction in the expected fashion. Satisfaction was only ranked sixth in total effects on dropout. An elaboration of the industrial model, presented elsewhere (Bean, 1981), suggests that satisfaction should be one of several

attitudinal or outcome variables which should be included in this model in the same location as satisfaction--intervening between the determinants and intent to leave.

Grades, Practical Value and Development (Pay Surrogate Measures). These three measures, each with a distinct identity of its own, but each treated in the model as a kind of payment for the student, contributed significantly in one or more of the regressions with satisfaction, intent to leave or dropout as the criterion. Grades was significant in all six regressions in Table 3, and was second most important in total effects on dropout. Practical value was significantly related to satisfaction, intent to leave and dropout, except in the regression of dropout on all the other variables in the model. Development was found to have the most influence on satisfaction, but was not significantly related to intent to leave or dropout. This set of variables should probably be entered into the path model as variables in their own right. In fact, they might all be considered as outcomes of the educational process, and be entered along with satisfaction as intervening variables, as suggested earlier (Bean, 1981a). Total effects for these variables indicated that grades was second in importance to intent in its influence on intent to leave, and practical value was ranked third. Development did not have total effects above .05, and thus may not be important in explaining dropout, but clearly was important in explaining satisfaction. The inclusion of these variables in future studies seems well justified.

Routinization. Routinization had a significant negative influence on satisfaction, but this influence was the lowest of the nine determinants significantly related to satisfaction. It was not related to intent or dropout. Although very important in the Price/Mueller model, routinization to a student undoubtedly means something different than routinization to a nurse. Its inclusion in future studies is not well justified on the basis of this study. Routinization for students may indicate students who have developed mature study habits--

students who schedule their time well. Thus students who find school highly repetitive and thus boring may be in the same category of routinization as those students who are delighted with school and schedule their time precisely to get the most out of it. Future research might focus on the study habits issue rather than on routinization per se.

Instrumental Communication. This variable was not significantly related to the intervening or the dependent variable. This is probably due to the way in which the variable was operationalized. Knowing rules is not similar to knowing how to use equipment or procedures related to a job. In the future, the variable should be operationalized related to knowing how to perform as a student, e.g., how to study, how to read, how to write, how to use the library, etc.

Participation. This variable had a significant positive relationship with satisfaction, but contributed little to the understanding of satisfaction. The importance of this variable may not emerge by the middle to the end of the second semester of the freshman year for a student. That is, a student may not expect to participate in decision making until later years in college. Table 2 indicates that there was only a small amount of participation for freshmen in this sample. The variable, however, was ranked ninth in total effects on dropout.

Integration. Integration, or having close friends, had a small but significant positive relationship with satisfaction, but was not related to intent to leave or dropout significantly. This finding was consistent with that of Price and Mueller, but contrary to the expectations of Tinto (1975) or Spady (1971). One problem may be in operationalization of the variable. It may be that the student's interpretation of close friends varies widely, or that everyone claims to have close friends, regardless of how close these friendships are. Finally, a close friend who is a poor student is not likely to be a good influence on

the respondent. It may be important to control for interaction effects based on student subcultures before fully understanding the influence of having close friends on satisfaction and dropout.

Courses. Having the courses one wants to take was significantly related to satisfaction in the predicted direction, but had a significant positive influence on dropout. It is not easy to explain this finding. Perhaps it is due to cognitive dissonance. That is, students like the courses offered, but either do poorly in them, or are not allowed to take them as freshmen, or are closed out of them. Finding themselves in this dissonant position, they withdraw from it by dropping out of school. Courses was ranked eighth in total effects on dropout.

Distributive Justice. A similar finding occurred with distributive justice. It has a positive significant relationship to satisfaction, but also a significant positive relationship to intent to leave. The problem may be in the way the variable is operationalized. The fairness in the way one is treated may not be central in the response of the subject. The response may be to what was considered as fair or unfair--e.g. whether one likes one's grades, or academic rules, or scholarship (or lack thereof). This variable also may become important only when one has had more experience with the institution.

Memberships in Campus Organization. This variable, only tangentially related to the turnover model, was found to be significantly related to satisfaction, intent to leave, and to dropout when only the determinants were in the equation. It was ranked seventh overall in influencing dropout. This variable may be one element of what Tinto (1975) considered as social integration, and should definitely be explored further.

Opportunity and Marriage. These two "environmental" variables played a fairly prominent role in the industrial model of student attrition, and were

tied for fourth, after intent, grades, and practical value, in influence on dropout. Although not something in which the institution can easily intervene, it is important to realize that the environment in which an institution finds itself can exhibit an important influence on student behavior. Most past studies of student attrition have not dealt directly with environmental influences on student behavior. Based on this finding for the industrial model, such influences should be assessed. Otherwise, an institution may invest heavily in a project which may only slightly alter a student's intent to leave or dropout, since students are being pulled away from, and not pushed out of, the institution.

Conclusions

The overall conclusion to be drawn from this study is that much can be learned about student behavior from the study of employee behavior in work organizations. The structure of the model of turnover, and to a large extent the variables in the model, have been useful in organizing this data on student attrition and providing some insights into the longitudinal process of student attrition. The significant paths in the model, indicated by the regressions presented in Table 3, are largely consistent with the expectations of how the model should operate based on Figure 1. Thus, the use of a model of turnover in work organizations for the study of student attrition is vindicated.

The chief difference between the findings for Price and Mueller (in press) and this study was in the effectiveness of intention as an intervening variable to influence dropout or turnover decisions. This difference was probably due to the shorter time interval for students than for nurses between gathering the data on the determinants and the data on dropout. Secondly, although Price and Mueller attempted to make a model that was "inclusive" of all important determinants, specification errors (leaving out important determinants or including unimportant determinants) are a way of life in the social sciences. Despite

the comparatively high amount of explained variance in the dropout study, most of that was due to the inclusion of the intent variable. Since only about 25 percent of the variance in intent to leave was explained, the industrial model of student attrition does not explain the variance of this intervening variable as well as other studies using the synthetic model of student attrition (Bean, 1981b,c). In the synthetic model, the pay surrogate measures would each be considered as outcomes of the educational process, and be located in the model as endogenous variables between the determinants and intent to leave. In fact, in one estimation of that model (Bean, 1981c) satisfaction was omitted as an intervening variable without a significant loss in the explained variance of intent to leave. Thus, although initially useful as an organizing concept, the industrial model is not sufficient to explain the dropout process. It was, however, incorporated as one element in the synthetic model (Bean, 1981a).

Compared to other studies of attrition using regression techniques (Spady, 1971; Terenzini and Pascarella, 1979; Cope and Hanna, 1975:13) the explained variance for this study is quite high. As indicated earlier, this is due largely to one variable--intent to leave--but also benefited from the inclusion of determinants such as opportunity and practical value, both of which were conceptualized as being borrowed from the literature on turnover, not from studies of student attrition. This is the key. There is a tremendous amount to be learned about universities from the study of other types of organizations. With organizational theory as a guiding force, and with the multitude of empirical studies of work organizations to choose from, the marriage between institutional researcher and this body of knowledge should be a fruitful one.

NOTES:

1. Determinants, according to the definition provided by Price (1977, p. 24), "are analytical variables which are believed to produce variations in turnover (or any criterion) . . . Like the correlates, the determinants are included in statements (called "propositions") which link them to turnover. Propositions are explanatory statements, whereas empirical generalizations are descriptive statements. Or somewhat differently: propositions are theoretical statements, whereas empirical generalizations are factual statements . . . Correlates are the indicators to which turnover is related . . . The empirical generalizations which embody the correlates describe, whereas the propositions which embody the determinants explain." Thus, correlates are related to a criterion, but are not assumed to explain why the criterion varies; determinants are expected to cause variations, and to be suitable for explaining why the criterion varies. Race may correlate with dropout behavior, but race does not explain why dropout rates differ for members of different races. A failure to perceive one's education as being of practical value, to the extent that it is related to dropout, would help explain why a student drops out. Thus, race would be a correlate and practical value would be a determinant of attrition.

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Table 1

Determinants and Intervening Variables: Definitions and Measures

Variable	Definition	# of Items	Sample Items
Intent to Leave	The estimated likelihood of discontinuing one's membership in the organization	2	Do you expect to return to this university next fall? Do you expect to be enrolled at this university one year from today?
Satisfaction	The degree to which a student likes being a student	4	How much do you agree or disagree with each of the following statements about your being a student? I find real enjoyment in being a student; I consider being a student rather unpleasant; I definitely dislike being a student; Most days I am enthusiastic about being a student.
Grades	University grade point average (pay surrogate measure)	1	What is your cumulative grade point average at this university?
Practical Value	The degree to which one's education is believed useful for getting a job (pay surrogate measure)	2	How useful do you think your education here will be for getting: Future employment? A really good job?
Development	The degree to which self-development is achieved through education (pay surrogate measure)	4	How much impact do you think attending this university will have in your development in each of the following areas? Knowing yourself; Using interpersonal skills; Seeing alternative points of view: Making value judgments.
Routinization	The degree to which being a student is repetitive	3	To what extent do you feel that each of the following aspects of campus life is routine, that is, done in the same way every day? Academic program; Daily life; Social life.

Table 1 (Continued)

Variable	Definition	# of Items	Sample Items
Instrumental Communication	The degree to which information about being a student is transmitted by the institution to its students	2	How well informed are you about: Academic rules here; Social rules here?
Participation	The degree of power that an individual exercises in classroom decisions	2	Here is a list of some decisions which are made at most universities. Please indicate how much say you feel you actually have in making these decisions: Kinds of course assignments; amount of course assignments.
Integration	The degree to which an individual has close friends among organizational members	3	How many close friends do you have who are: In your classes; Roommates, or live near you in the building or house?; In extra-curricular activities with you?
Courses	The degree to which a student views the content of the curriculum as desirable	1	To what extent does this university offer the courses you want to take?
Distributive Justice	The degree to which rewards and punishments are related to the amount of input into the student role	3	To what extent are each of the following things done fairly at this university (in your opinion)? Enforcement of academic rules (e.g., against cheating); Grading; Awarding scholarships.
Campus Organizations	The degree to which a student is integrated into the co-curricular activities of the institution	1	How many campus organizations do you belong to?
Opportunity	The availability of alternative student roles in the organization's environment	2	How difficult do you think it would be for you to leave this university and do each of the following: Transfer to another college, university, or junior college? Transfer to a college or university as good as this one?
Marriage	The likelihood of marrying before completing college	2	How likely are you to get married: In the next year? Before graduating?

Table 2

Correlation Matrix for All Variables (N=820)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	--														
2.	.673	--													
3.	-.212	-.257	--												
4.	-.270	-.204	.206	--											
5.	-.235	-.394	.282	.143	--										
6.	-.151	-.227	.361	.110	.342	--									
7.	.043	.118	-.113	.004	-.110	-.041	--								
8.	-.028	-.077	.148	.062	.140	.194	-.059	--							
9.	-.075	-.077	.110	-.053	.020	.095	-.037	.047	--						
10.	-.097	-.177	.207	.057	.186	.162	-.082	.199	.126	--					
11.	-.074	-.201	.302	.123	.371	.297	-.112	.163	.052	.111	--				
12.	.010	-.021	.167	-.046	.225	.153	.031	.093	.048	.007	.253	--			
13.	-.173	-.224	.204	.246	.134	.128	-.092	.081	.002	.232	.105	-.018	--		
14.	.188	.244	-.093	-.033	-.120	-.140	.056	.032	-.062	-.062	-.127	-.029	-.065	--	
15.	.178	.154	-.061	-.075	-.005	-.012	-.040	.093	-.078	-.007	-.010	.028	-.057	.047	--
Mean	.34	3.72	15.32	5.68	7.72	13.14	9.72	6.49	4.45	10.89	3.76	9.27	1.83	6.71	4.09
SD	.72	2.71	3.00	1.30	1.97	3.52	2.13	1.44	1.99	3.25	.76	1.88	1.02	1.93	2.10

Key: 1=Dropout; 2=Intent to Leave; 3=Satisfaction; 4=Grades; 5=Practical Value; 6=Development; 7=Routinization; 8=Instrumental Communication; 9=Participation; 10=Integration; 11=Courses; 12=Distributive Justice; 13=Campus Organizations; 14=Opportunity; 15=Marriage.

Table 3

REGRESSION RESULTS (STANDARDIZED COEFFICIENTS) FOR DROPOUT, INTENT TO LEAVE AND SATISFACTION AS DEPENDENT VARIABLES (N=820)

Independent Variables	Satisfaction (1)	Intent to Leave (2)	(3)	Dropout (4)	(5)	(6)
Grades	.129***	-.104***	-.094**	-.213***	-.200***	-.139***
Practical Value	.075*	-.312***	-.306***	-.185***	-.178***	.020
Development	.227***	-.055	-.036	-.048	-.026	-.003
Routinization	-.065*	.056	.051	0.15	.008	-.024
Instrumental Communication	.028	-.011	-.009	.002	.005	.010
Participation	.064*	-.043	-.038	-.060	-.054	-.030
Integration	.093**	-.053	-.045	-.014	-.005	.024
Courses	.133***	-.020	-.009	.060	.073*	.079**
Distributive Justice	.086**	.059	.066*	.035	.044	.001
Campus Organizations	.088**	-.110***	-.103**	-.073*	-.064	.002
Opportunity	-.008	.173***	.173**	.144***	.143***	.032
Marriage	-.043	.127***	.124***	.145***	.141***	.061*
Satisfaction			-.081*		-.098*	-.046
Intent to Leave						.644***
R^2	.243	.266	.271	.176	.183	.486
$\bar{R}^2$	.232	.255	.259	.164	.170	.477

*p $\leq$ .05
**p $\leq$ .01
***p $\leq$ .001

Table 4. DIRECT, INDIRECT, AND TOTAL EFFECTS ON DROPOUT AND RANK IN INFLUENCING DROPOUT (N=820)

Determinants	Direct Effects on Dropout	INDIRECT EFFECTS VIA Satis-faction	Intent to Leave	Satisfaction and Intent	Total Effects	Rank
Intent to Leave	.644		--	--	.644	1
Satisfaction	-.046	--	-.052	--	-.098	6
Grades	-.139		-.060	-.007	-.206	2
Practical Value	.020		-.197	-.004	-.181	3
Development	-.003		.023	-.012	.008	
Routinization	-.024		.033	.003	.012	
Instrumental Communication	.010		-.006	-.001	.003	
Participation	-.030		-.024	-.003	-.057	9
Integration	.024		-.029	-.005	-.010	
Courses	.079		-.006	-.007	.066	8
Distributive Justice	.001		.043	-.004	.040	
Campus Organizations	.002		-.066	-.005	-.069	7
Opportunity	.032		.111	.000	.143	4.5
Marriage	.061		.080	.002	.143	4.5

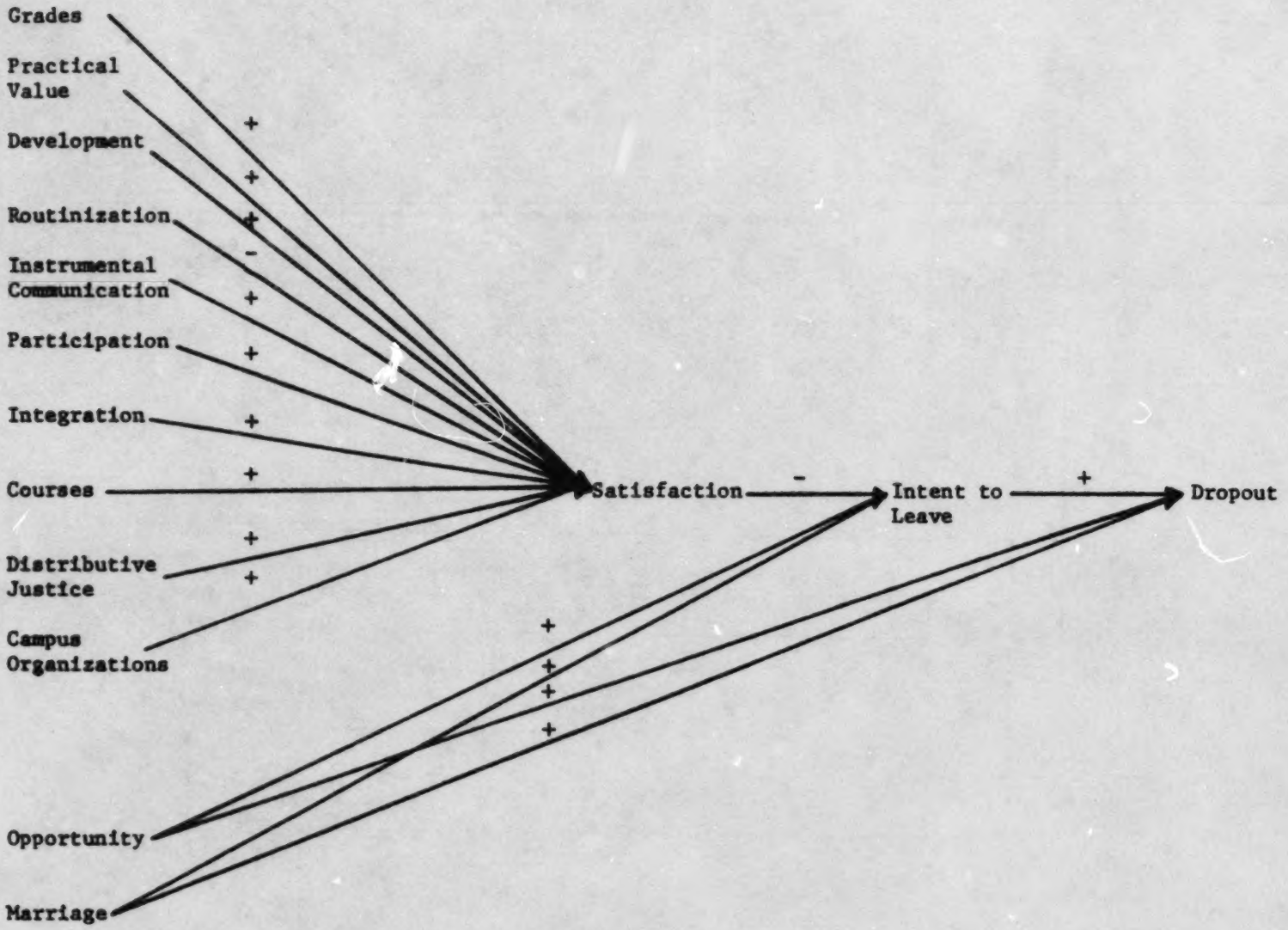

Figure 1. The Industrial Model of Student Attrition

APPENDIX. SELECTED ZERO-ORDER CORRELATIONS FOR THREE STUDIES[a]

	SATISFACTION			INTENT TO LEAVE[b]			DROPOUT/TURNOVER		
	P/M (1)	B.0 (2)	B.1 (3)	P/M (4)	B.0 (5)	B.1 (6)	P/M (7)	B.0 (8)	B.1 (9)
Intent to Leave	--	--	--	--	--	--	.404	.456	.673
Satisfaction	--	--	--	-.300	-.359	-.257	-.121	-.145	-.212
Grades	N	.181	.206	N	-.165	-.204	N	-.119	-.270
Practical Value	N	.310	.282	N	-.341	-.394	N	-.176	-.235
Development	N	.389	.361	N	-.254	-.227	N	-.150	-.151
Routinization	-.374	-.252	-.113	.063	.150	.118	.005	-.028	.043
Communication	.293	.145	.148	-.145	-.073	-.077	-.074	.035	-.028
Participation	.238	.101	.110	-.117	.068	.077	-.044	.020	.075
Integration	.060	.211	.207	-.035	-.183	-.177	-.011	-.075	-.097
Distributive Justice	.060	.173	.167	-.046	-.076	-.021	-.025	-.077	.010
Campus Organizations	N	.199	.204	N	-.228	-.224	N	-.148	-.173
Opportunity	-.031	-.120	-.093	.169	.335	.244	.187	.144	.188

Key: P/M = Price and Mueller, in press; B.0 = Bean, 1980; B.1 = This study; N = no data.

[b]For the Price/Mueller study, Intent to stay was changed to intent to leave.

[a]Selected on the basis of available data.